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for
Small Pine Saw Timber
and Pulpwood

by

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COMPARATIVE STUMPAGE PRICES FOR SMALL PINE SAW TIMBER AND PULPWOOD

by

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The purpose of this paper describing comparative stumpage prices is to provide a convenient marketing aid for sellers of pine stumpage who wish to know whether it is more profitable to sell their stumpage as saw timber or pulpwood.

In the southern Piedmont, the dominant pine markets are pulpwood and saw timber. Integrated sales of pulpwood and saw timber are not common, and the usual sale is for a single product. Trees below 8 inches d.b.h. (diameter breast high) are seldom cut for lumber, and trees above 14 inches d.b.h., where size and quality generally favor saw-timber markets, are not commonly cut for pulpwood. Between these diameter limits, pine of average quality is commonly bought and sold in lively competition between sawmill operators and pulpwood contractors.

Ignoring quality, the pulpwood stumpage value of a tree or stand is the product of volume in cords and the obtainable price per cord. For the same tree or stand, the saw-timber stumpage value is, similarly, the product of the saw-timber volume and the obtainable price per thousand board feet. If, as frequently occurs, an owner has the choice of selling to either a pulpwood or a saw-timber market, it is to his advantage to know how the obtainable price per cord and per thousand board feet compare. For example, if a sale is contemplated in a stand where the trees to be sold have a ratio of cordwood volume to board-foot volume of 3 cords for each thousand feet of saw timber, it is clear that an equivalent saw-timber stumpage price must be three times the pulpwood price per cord. Thus, when pulpwood is selling for 3 dollars per cord, an equivalent saw-timber bid above 9 dollars would be more attractive.

Comparative prices between these two products are easily obtained by comparing two ratios, one of which is a characteristic of the trees to be sold and the other a market condition. The first is the ratio of cords/MBF; the second is the ratio of going price per MBF to that of pulpwood per cord. When the two ratios are equal, neither product has a financial advantage. This situation is expressed as follows:

$$\frac{\text{Cords}}{\text{MBF}} = \frac{\text{Price per MBF}}{\text{Price per cord}}$$

If the price ratio is greater than the volume ratio, a saw-timber sale is more attractive to the owner, and if the price ratio is less, a pulpwood sale is preferred.

Except within narrow limits of bargaining, forest owners and buyers are not able to alter the bidding price of saw timber or pulpwood. Consequently, the price ratio at the time of sale is fairly stable, and if the owner's choice of market depends upon a financial advantage, he should know something of the volume ratio of the trees to be sold.

The volume ratio (cords/MBF) changes with all the factors which affect either board-foot or cubic-foot volume, including diameter, form, and height of the tree, utilization practice, and method of scaling. One method of obtaining volume ratios is to construct volume tables by diameter and height, showing average cordwood volume to a pulpwood top, and average board-foot volume of the saw-timber portion of the same tree. Height classification may be by total height or by merchantable height in number of pulpwood bolts. Tree form may be included as a variable if greater precision is desired. For purposes of this discussion, and for general use, these variables have been compressed to their average values in a local volume table based on diameter only.

Tables 1 and 2 show merchantable height and volume by d.b.h. classes for average trees of typical loblolly pine stands in the southern Piedmont, on the Hitchiti Experimental Forest. [1] In each diameter class, merchantable height of saw timber is to a nominal 7-inch top, and merchantable height of pulpwood is to a 4-inch top, inside bark.

Table 1.--Solid and stacked pulpwood volumes of average trees

D.b.h. (inches)	5-1/4-ft. bolts	Solid volume	Stacked volume [1]
	Number	Cubic feet	Standard cords
8	6	7.6	.08
9	7	10.9	.11
10	7	13.9	.15
11	8	18.8	.19
12	9	25.0	.24
13	9	29.7	.29
14	10	37.4	.37

[1] Stacked volume is derived from solid volume and merchantable height by the equation: Stacked volume = .00195(# of bolts) + .00932(solid volume). Taken from "Stacked and Solid Volume of Southeastern Pulpwood," by F. X. Schumacher, Jour. Forestry 44: 579-82, 1946.

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[1] Southern Piedmont Research Center of the Southeastern Forest Experiment Station, located near Macon, Ga.

Table 2.--Board-foot contents of average trees by International 1/4-inch, Scribner, and Doyle log rules

D.b.h. (inches)	Merchantable length of tree	Saw-timber volume		
		Int. 1/4-in.	Scribner	Doyle
	Feet	Bd. ft.	Bd. ft.	Bd. ft.
8	14	20	18	12
9	18	30	27	16
10	24	44	39	22
11	28	60	53	30
12	32	82	71	39
13	38	106	91	56
14	42	146	125	83

Ratio of Number of Cords per M Board Feet

The stacked volumes in table 1 and board-foot volumes in table 2 provide a basis for determining the ratio of number of cords per M board feet by d.b.h. classes (table 3).

Table 3.--Ratio of number of cords per M board feet by International 1/4-inch, Scribner, and Doyle log rules

(In cords per M board feet)

D.b.h. (inches)	Int. 1/4-in.	Scribner	Doyle
8	4.0	4.4	6.8
9	3.7	4.1	6.8
10	3.4	3.8	6.8
11	3.2	3.6	6.3
12	2.9	3.4	6.2
13	2.7	3.2	5.2
14	2.5	3.0	4.5

The gross error in estimating board-foot contents by the Doyle rule accounts for the high cords/MBF ratios when using this rule. The International 1/4-inch rule is considered to provide the best estimate of actual lumber tally.

Upon determining the number of cords per thousand board feet by d.b.h. classes and by any log scaling system, the comparative stumpage prices for pulpwood or saw timber for any given volume ratio may be read directly from the chart in figure 1.

Another type of chart which some may wish to make for their particular locality and scaling method is shown in figure 2. This chart applies

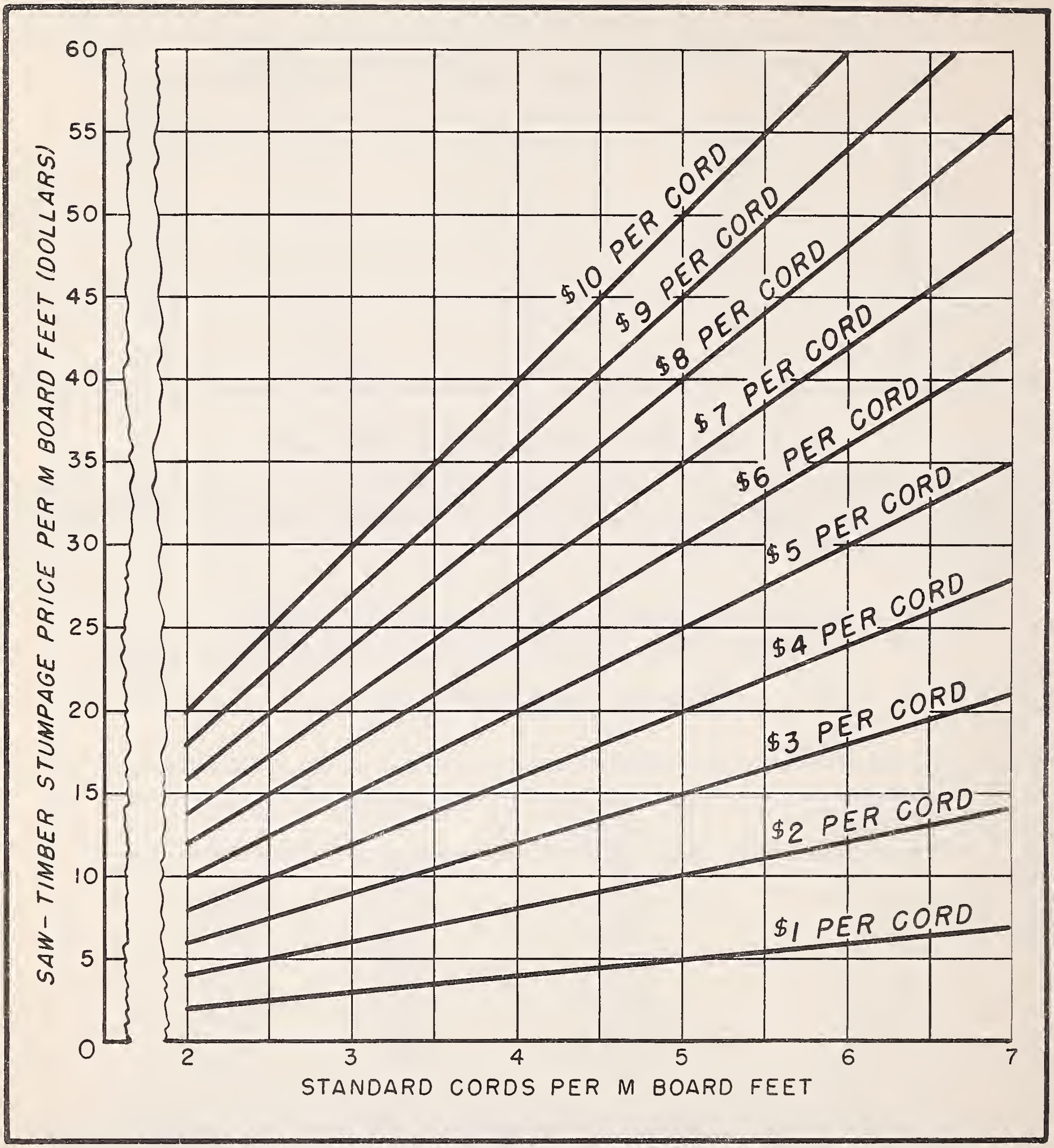

Figure 1.--Comparative stumpage prices for pulpwood and saw timber based on number of standard cords of pulpwood per M board feet of saw timber. Average ratios of cords per M board feet for different tree sizes and log scales can be read from table 3.

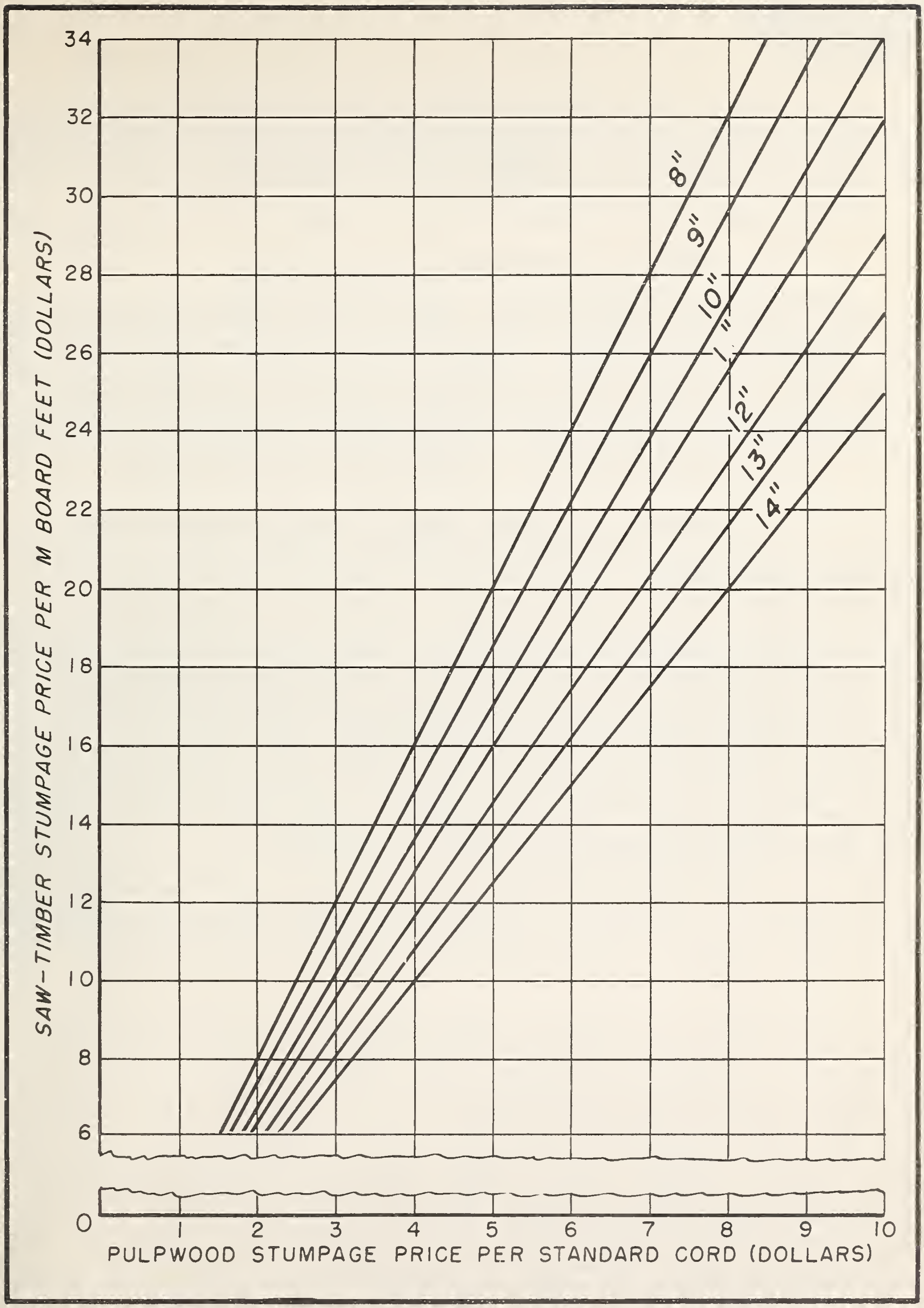

Figure 2.--Comparative stumpage prices for loblolly and shortleaf pine pulpwood and saw timber, International 1/4-inch scale, in the southern Piedmont. This scale most closely approximates a mill tally scale.

to average trees in the southern Piedmont, and is based on the ratios of cords/MBF for the International 1/4-inch scale as given in table 3. Where Scribner or Doyle log rule is more commonly used, a similar chart based on the respective ratios of cords/MBF may be constructed.

Application of Comparative Stumpage Values

Anyone with merchandise to sell ought to know something about it so that he can make a wise trade. Most sellers of stumpage should know at least how many trees by d.b.h. classes he has for sale before he accepts a final bid. In typical even-aged stands, where all the trees marked for cutting are about the same size, a single average diameter is sufficient. In many-sized stands, where the trees marked for cutting have a wide variation, a tally of trees by d.b.h. classes would be more useful.

By using the volume ratios from table 3 in conjunction with figure 1, a seller of stumpage can determine whether he should sell his trees for pulpwood or saw timber.

For example, a tally of trees to be cut in an even-aged stand may indicate an average diameter of 10 inches. From table 3 the cords/MBF ratio by International 1/4-inch scale is 3.4. If the going stumpage price for pulpwood was $3.00 per cord, a comparative saw-timber stumpage would be $10.00 per M board feet International 1/4-inch (see figure 1). If the saw-timber stumpage price offered is more than this, the seller should sell his trees for saw timber; otherwise, he should sell them for pulpwood. A similar procedure would be followed if the saw-timber stumpage price was known and a comparative pulpwood price was desired.

Where the small quantities of cordwood in the tops of saw-timber trees can be marketed for pulpwood, the borderline cases can best be decided in favor of saw timber. In the interest of simplicity, no account was taken of this fact in the determination of comparative stumpage values.

If a cut were to be made in a many-sized stand, there would be a wider range of diameters, and the seller may want to know which trees should go for pulpwood and which for saw timber. Assuming the going stumpage prices are $4.00 per cord and $15.00 per M International 1/4-inch, a cords/MBF ratio, taken from figure 1, is 3.7. Inspection of the International-scale column in table 3 shows that the 3.7 ratio applies to the 9-inch diameter. Thus, a seller would receive the greatest profit by selling trees 10 inches and larger for saw timber and trees 9 inches and less for pulpwood. If the bulk of trees were under 10 inches, he would probably have to sell the entire cut as pulpwood, and vice versa if most of the trees were over 10 inches. By using a chart similar to figure 2, this diameter breaking-point may be determined directly for International 1/4-inch scale.

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There is a more limited market for poles and piling or veneer stock, and if the seller feels that some of his trees may qualify, he should contact buyers, learn their specifications, and then look over his timber again. If there is a sufficient number of trees that meet the specifications, it will nearly always be most profitable to sell these trees in such markets.

In any sale, regardless of product being sold, there are factors other than price which should be taken into consideration. The opportunity to sell readily in the several markets may be lacking. The integrity of the buyer or operator, the confidence the seller has that the operator will cut only marked trees with little damage to the remaining trees, and the method and promptness of payment, are all points which may favor one buyer in spite of a small difference in stumpage price.

Application of Ratios Outside the Southern Piedmont

The data apply particularly to the shortleaf-loblolly pine stands of the southern Piedmont, but may be applied in other areas where tree taper, top d.i.b. (diameter inside bark), utilization, and log and bolt lengths cut are similar. Anyone using these data should satisfy himself that the general run of trees in his area have ratios of cords/MBF similar to those shown in table 3. If utilizable volumes by d.b.h. classes for pulpwood and saw timber can be determined with reasonable accuracy and are found to differ from those given, a new set of ratios based on local data can be prepared quite easily. One may then use the chart in figure 1 to determine comparative stumpage prices for pulpwood and saw timber in his locality. If the local ratios cannot be determined, or if only rough approximations can be made, then the comparative stumpage prices based on the ratios in table 3 should not be used indiscriminately, but be considered only as rough guides.

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